Developing an ArcPad Application for Exotic Species Monitoring in Saguaro National Park

A Mobile GIS Application

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THE UNIVERSITY OF ARIZONA.
SCHOOL OF
NATURAL RESOURCES
COLLEGE OF AGRICULTURE AND LIFE SCIENCES

NATIONAL PARK SERVICE

Overview

- Ecological monitoring and field data collection
- Choosing a development platform
- Developing the application
- Evaluating the application

Exotic Species Monitoring

- Requires collecting lots of data in the field
- Survey large area
- Time

Solution?

Mobile GIS Application

Client Specification

- Developing a Microsoft Access database that is compatible with current National Park Service database
- Easy to use, user friendly
- Decrease the amount of data pre and post processing

Everything Automated!

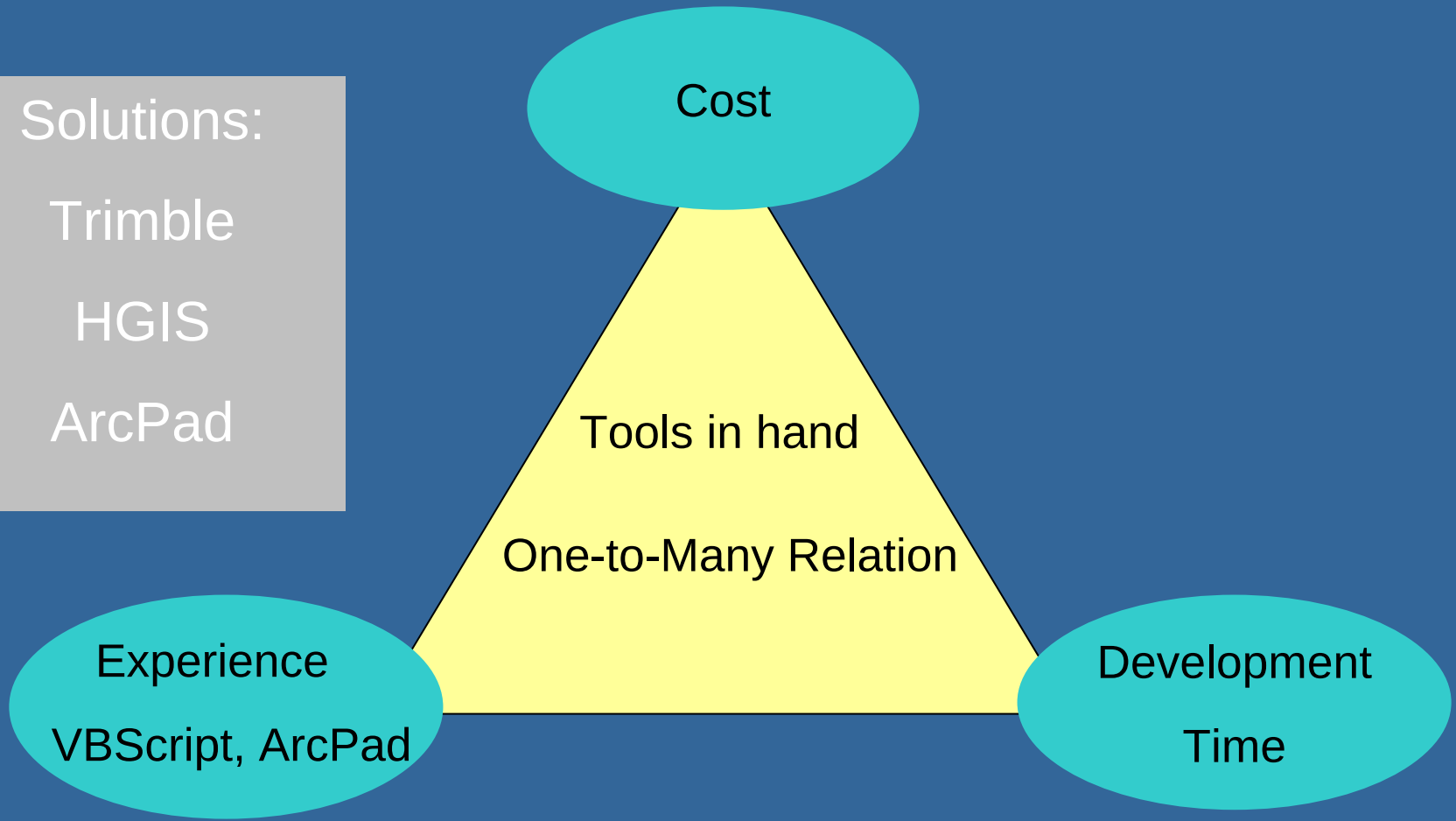
Why ArcPad?

Solutions:

Trimble

HGIS

ArcPad



Project Design

- Current field data collection and storage structure

- ArcPad application development process

Field Data Collection Process

Ecologists collect two kinds of attributes:

- Site specific attributes
  Elevation, slope, aspect

- Species attributes
  Name, %of cover, …

http://images.google.com

Therefore,

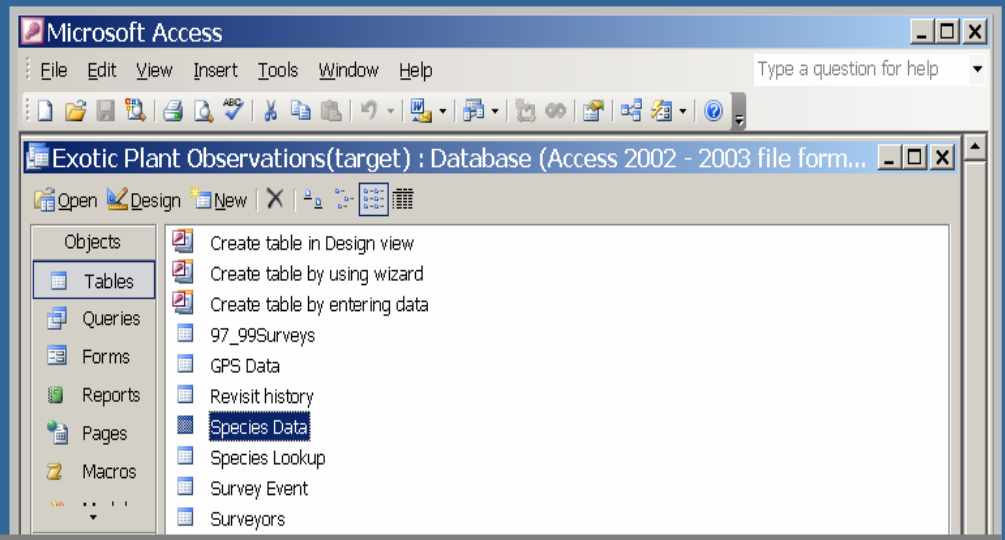
Multiple observations per location point

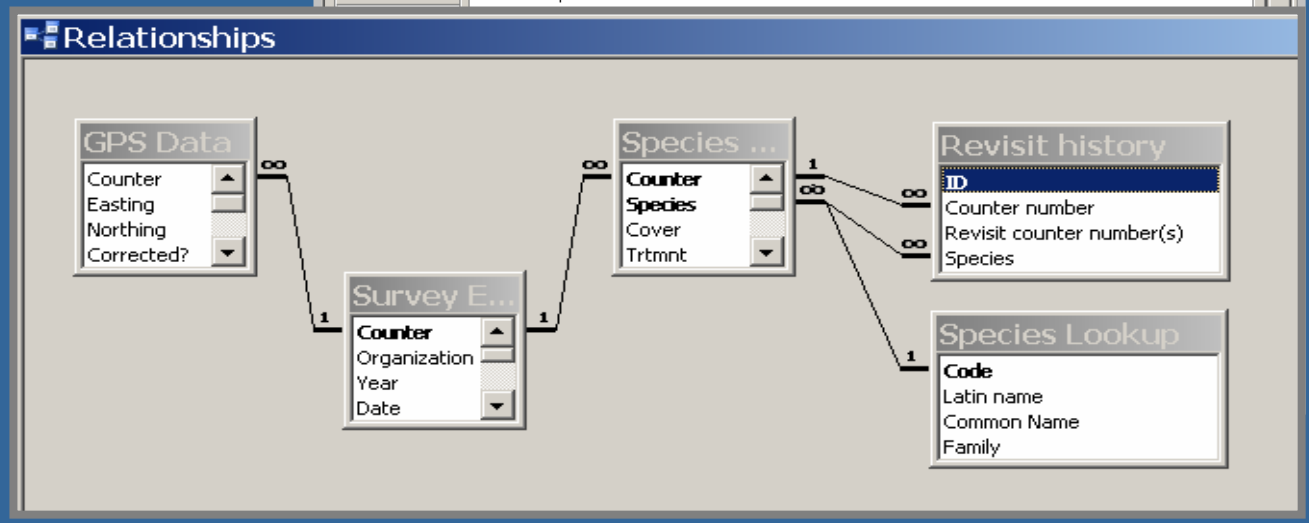
Sample Form

Date of field observations:				**Ownership: National Park Service**			**Datum of original data:**
Start time (for GPS data):				**Region: Intermountain Region (NPS)**			**Coordinate system:**
End time (for GPS data):				**Network name:**			**UTM zone:**
Surveyor Name:				**Park Unit (code):**			**Scale of Data source:**
Data Source:				**Country: USA**			**USGS Quad name:**
				State (code): **County:**			
site ID	**Counter**	**coord E**	**coord N**	**plant name**	**Canopy Cover (%cover)**	**Treatment (Yes, No)**	**Phenology**
1							
2							
3							

Data Storage

- Collecting data in paper forms
- Enter data to Access database
- Time, errors





Application Development Process

- Assess Out-of-the-box components
- Establish One-to-Many relates
- Add custom components

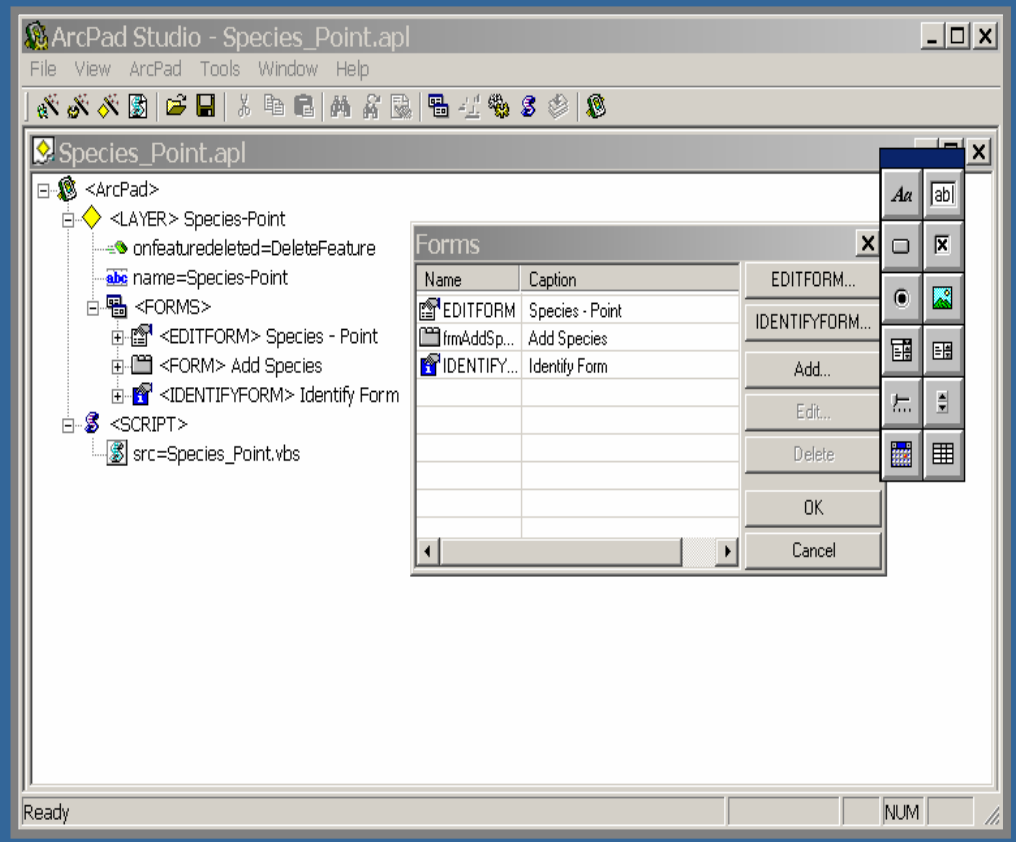
Features in ArcPad

- Stores data in Shapefile format
- Data attribution using customized forms
- Add Image to the background
- GPS connection
- Simple symbology
- Labels

Create Customized forms

ArcPad Studio

- ArcPad Layer file
- Edit Form
- Identify Form



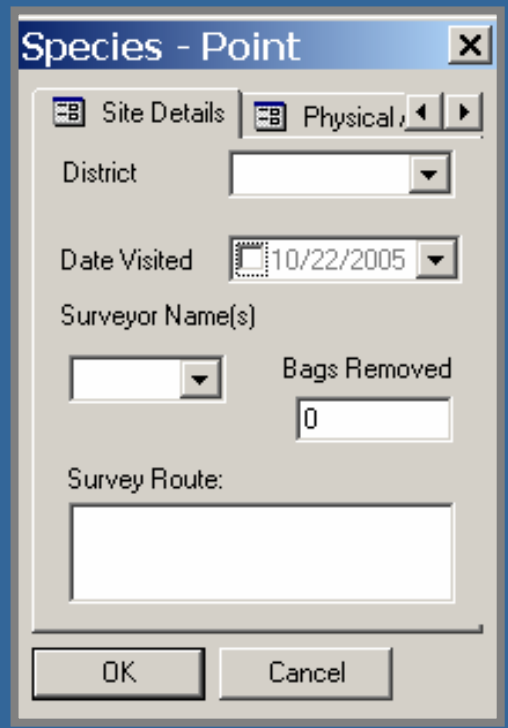
Our Solution

- Storing Site Attributes in a shapefile attribute table

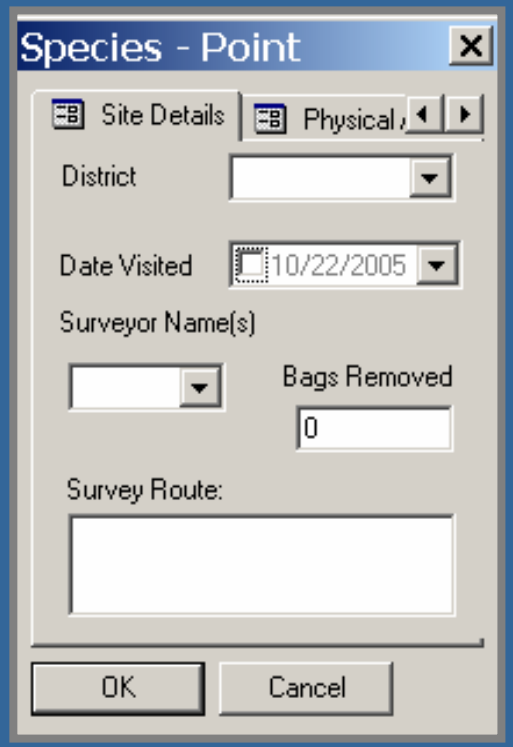
- Storing Species Observations in a separate database file

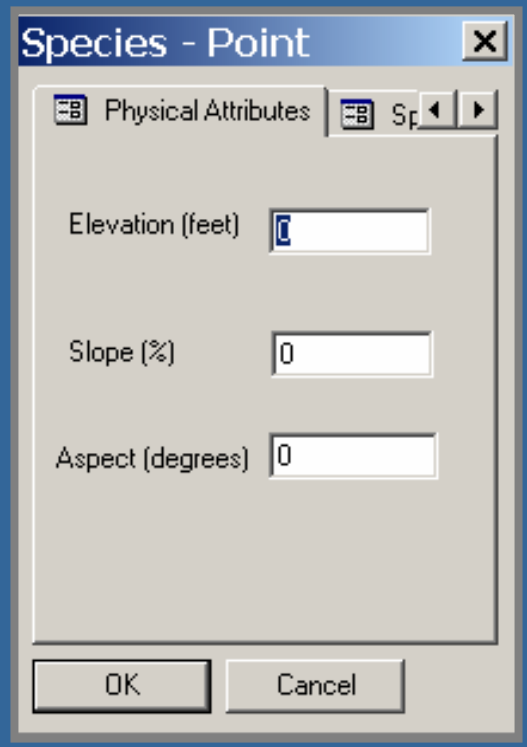
Development Process

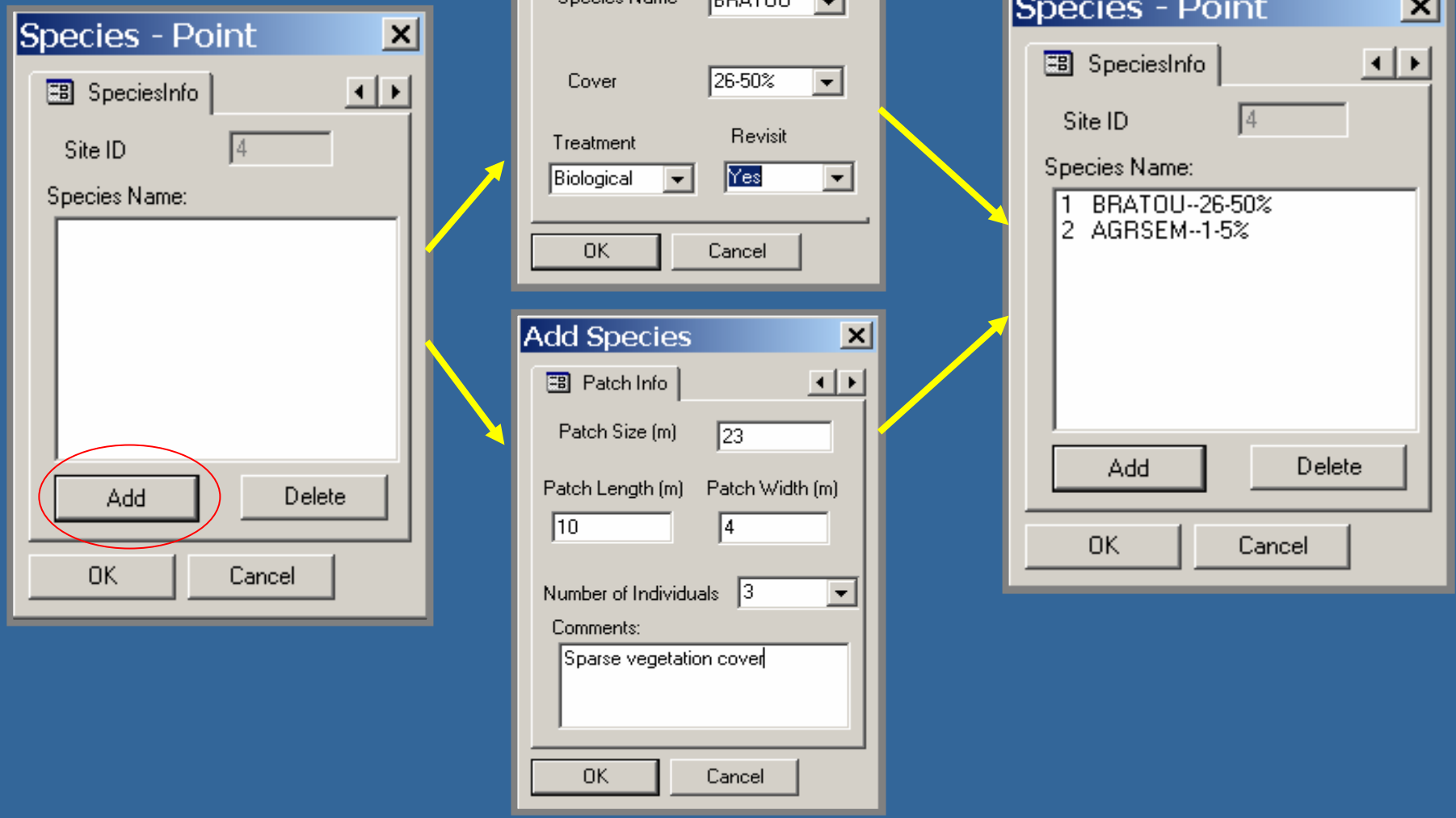
- Store Site Attributes in a shapefile attribute table



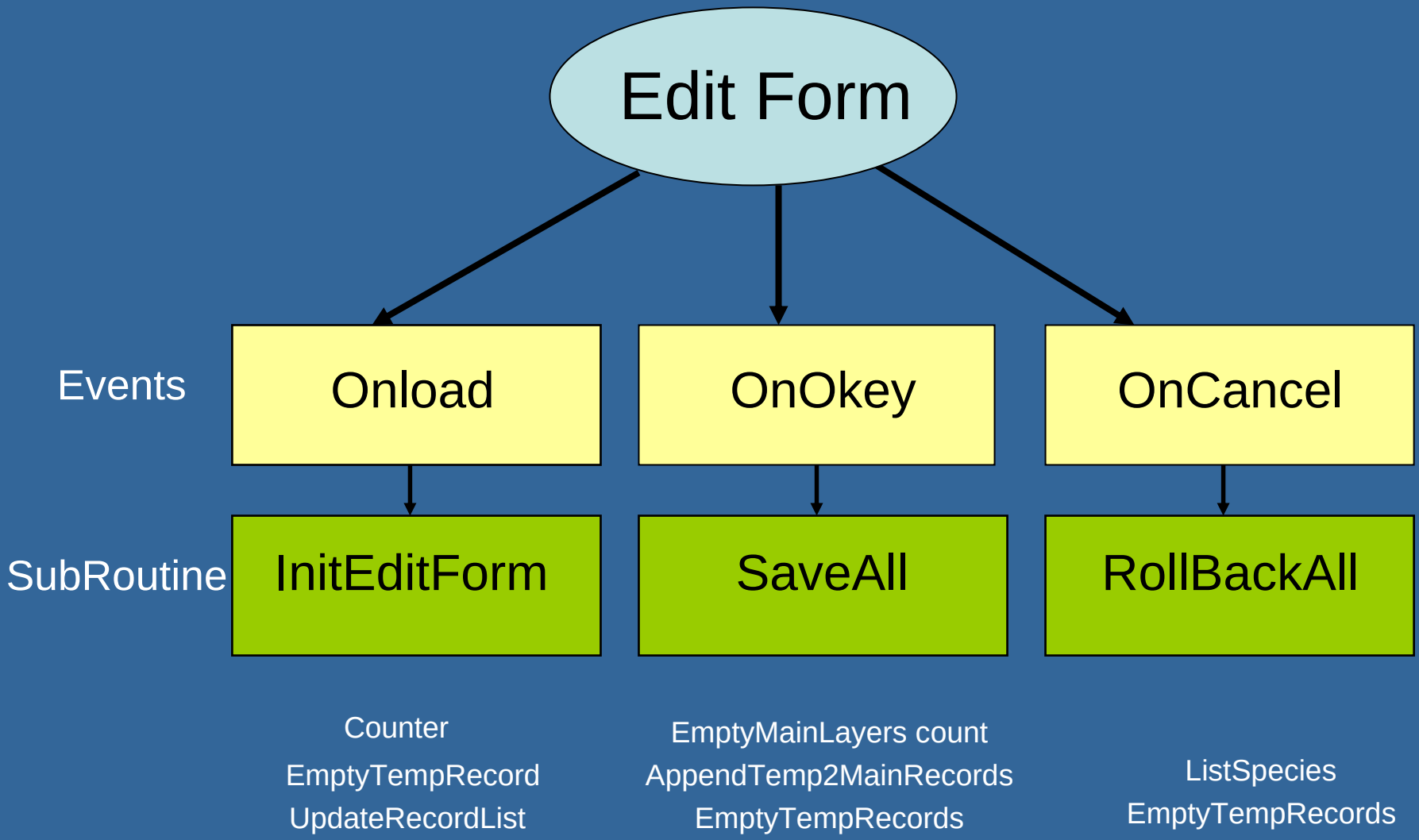
Custom forms

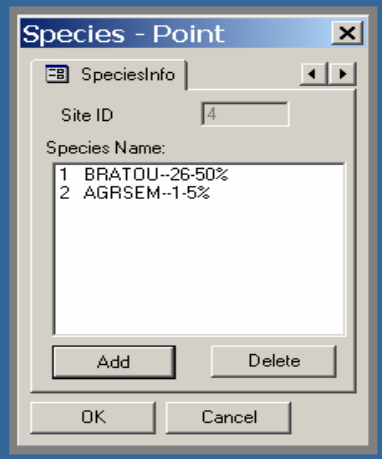





Species - Point
SpeciesInfo
Site ID
4
Species Name:
Add
Delete
OK
Cancel
Add Species
Species Information
Site ID
4
Observation Number
1
Species Name
BRATOU
Cover
26-50%
Treatment
Biological
Revisit
Yes
OK
Cancel
Add Species
Patch Info
Patch Size (m)
23
Patch Length (m)
10
Patch Width (m)
4
Number of Individuals
3
Comments:
Sparse vegetation cover
OK
Cancel
Species - Point
SpeciesInfo
Site ID
4
Species Name:
1 BRATOU--26-50%
2 AGRSEM--1-5%
Add
Delete
OK
Cancel

Form Properties





SpeciesInfo Page

Add

Delete

Events

OnClick

OnClick

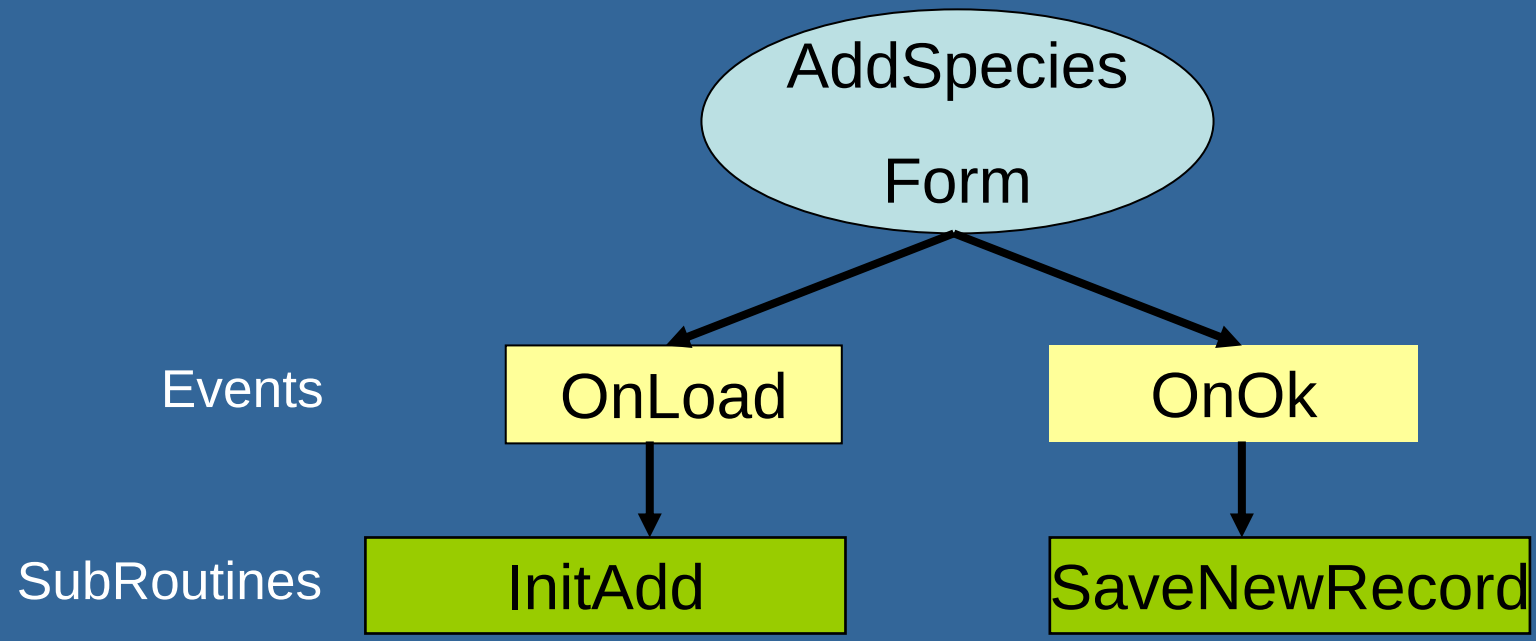
SubRoutine

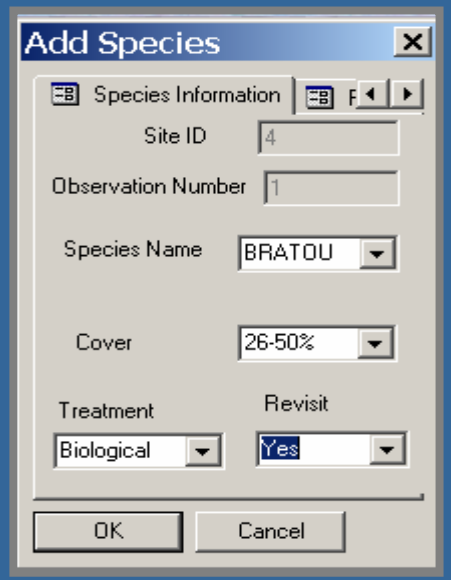
OpenAddNewRecord

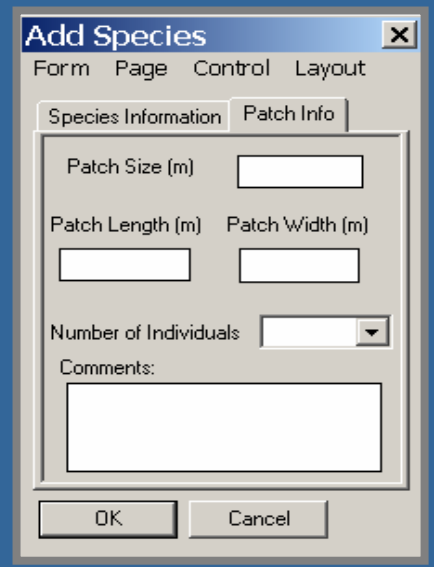
DelSelectRecord

Form

AddSpecies


AddSpecies
Form
Events
OnLoad
OnOk
SubRoutines
InitAdd
SaveNewRecord


Add Species
Species Information
Site ID
4
Observation Number
1
Species Name
BRATOU
Cover
26-50%
Treatment
Revisit
Biological
Yes
OK
Cancel

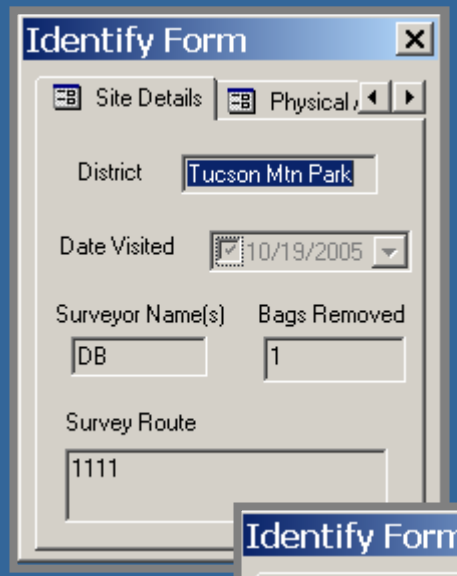

Add Species
Form
Page
Control
Layout
Species Information
Patch Info
Patch Size (m)
Patch Length (m)
Patch Width (m)
Number of Individuals
Comments:
OK
Cancel

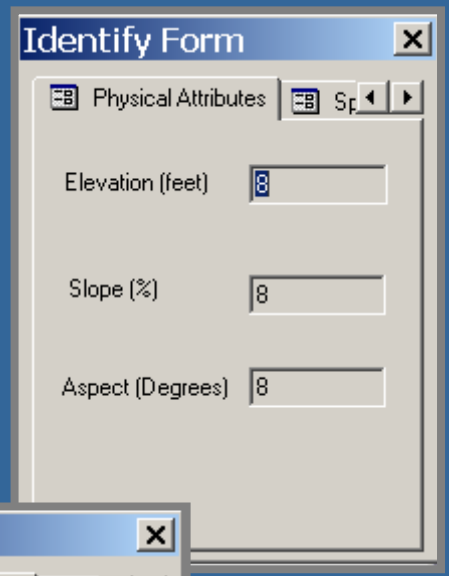
One-Many Relates in ArcPad?

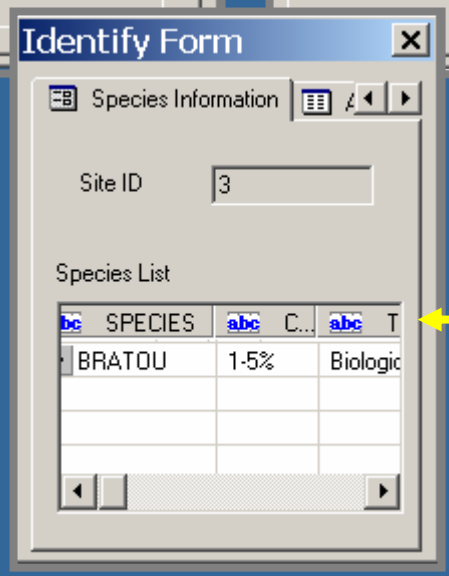
- Create a “dbf” file for each shapefile to record observations
- Access the records in “dbf” through forms and ArcPad object “RecordSet”

Data Query


iPAQ
3
2
1
0km
430.72km
861.43km
1:23255725
Fea 1158074.1 3672609.8 1:232557
Pocket PC


Identify Form
Site Details
Physical
District
Tucson Mtn Park
Date Visited
10/19/2005
Surveyor Name(s)
Bags Removed
DB
1
Survey Route
1111


Identify Form
Physical Attributes
Elevation (feet)
8
Slope (%)
8
Aspect (Degrees)
8


Identify Form
Species Information
Site ID
3
Species List
SPECIES
C...
T
BRATOU
1-5%
Biologic

Demonstration

Post Processing in ArcGIS

- Python code for re-numbering an attribute “COUNTER”
- “Append” the dbase file to preexisting Access database

Conclusion

- ArcPad can be used effectively for field data collection
- Represents a middle scale solution in terms of development time, cost, and functionality.
- One-to-Many relates can be established in ArcPad, requires lots of scripting

Thank You

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